AMENDMENTS TO THE CLAIMS

Please enter the following amendments to the claims:

Claim 1 (Currently Amended): In an apparatus for steam reforming of a vaporizable hydrocarbon a ~~the~~ combination that includes:

a) a ~~A~~ steam reforming reactor comprising two concentric sections including a larger outside section and a smaller inside section and an annulus containing reforming catalyst between said sections;

b) said ~~Said~~ annulus section having an inlet for steam and vaporizable hydrocarbon, a flow path for hydrogen and by-product gases resulting from reforming reactions taking place in said annulus section, and an outlet for said by-product gases;

c) said ~~Said~~ outside section being in heat transferring contact with said annulus section, and having an inlet for preheated air or other oxidant and a plurality of tubes for fuel gas, said tubes having openings through which the fuel gas flows and is mixed with said air or other oxidant resulting in flameless distributed combustion, whereby uniform or tailored, controlled heat is transferred to said annulus section; and

d) said ~~Said~~ inside section having a hydrogen-selective, hydrogen-permeable membrane positioned either on the inside or outside of said inside section, and an outlet for hydrogen which permeates through said membrane from said annulus section into said inside section and passes through said outlet.

Claim 2 (Currently Amended): The apparatus of Claim 1 wherein an inlet adapted to convey a sweep gas is in communication with said inside section ~~used~~ to promote the diffusion of hydrogen through said membrane~~, said sweep gas being selected from the group consisting of steam, carbon dioxide, nitrogen and condensable hydrocarbon~~.

Claim 3 (Canceled)

Claim 4 (Original): The apparatus of Claim 3 wherein said reforming catalyst comprises at least one Group VIII transition metal.

Claim 5 (Original): The apparatus of Claim 4 wherein said reforming catalyst comprises nickel.

Claim 6 (Original): The apparatus of Claim 4 wherein said reforming catalyst is on a support.

Claim 7 (Original): The apparatus of Claim 6 wherein said support is selected from the group consisting of oxides, carbides, or nitrides of Group III A, IIIB, IV A, IVB, or Group VIII metals of the Periodic Table.

Claim 8 (Currently Amended): The apparatus of Claim 7 wherein said support is selected from the group consisting of porous metal oxides ~~that are inert on their own and porous metal oxides that have the capacity to passivate the surface of a support~~.

Claim 9 (Canceled)

Claim 10 (Original): The apparatus of Claim 8 wherein the support comprises alumina.

Claim 11 (Original): The apparatus of Claim 10 wherein said reforming catalyst comprises nickel on alumina.

Claim 12 (Currently Amended): The apparatus of Claim 1 wherein said hydrogen-permeable selective membrane comprises one or more ~~Group VIII transition~~ metals selected from the group consisting of palladium, platinum, nickel, silver, tantalum, vanadium, yttrium, niobium, cerium, holmium, lanthanum, and gold or alloys thereof.

Claim 13 (Currently Amended): The apparatus of Claim 12 wherein ~~further comprising~~ said hydrogen-permeable membrane is situated on a support.

Claim 14 (Original): The apparatus of Claim 13 wherein the support is selected from oxides, carbides, and nitrides of Group IIIA, IIIB, IVA, and IVB.

Claim 15 (Original): The apparatus of Claim 13 wherein the support comprises a porous metal or porous ceramic support.

Claim 16 (Original): The apparatus of Claim 13 wherein the support comprises a porous metal support.

Claim 17 (Original): The apparatus of Claim 15 wherein the support comprises alumina.

Claim 18 (Currently Amended): The apparatus of Claim 15 wherein the support comprises porous stainless steel ~~or Hastelloy or Inconel~~.

Claim 19 (Currently Amended): The apparatus of Claim 13 wherein ~~further comprising~~ said membrane support is located ~~provides an intermediate layer~~ between the membrane and the catalyst.

Claim 20 (Currently Amended): The apparatus of Claim 19 wherein ~~further comprising~~ the membrane support ~~serves as a thermal insulating layer to assist in keeping~~ is adapted to limit heat transfer to the membrane ~~at a desired temperature~~.

Claim 21 (Currently Amended): The apparatus of Claim 20 wherein ~~further comprising~~ the support is alumina ~~and the concentration of alumina permits the tailoring of the design to emphasize insulating or conducting properties~~.

Claim 22 (Original): The apparatus of Claim 12 wherein said hydrogen-permeable membrane is selected from palladium and palladium alloys.

Claim 23 (Original): The apparatus of Claim 22 wherein said hydrogen-permeable membrane comprises at least one of an alloy of Pd with 30-50 wt% copper, an alloy of Pd with 5-30 wt% silver, an alloy of Pd with 1-10 wt% yttrium, an alloy of Pd with 1-10%w holmium, an alloy of Pd with 10%w gold, an alloy of Pd with 1-10%w ruthenium and an alloy of Pd with 1-10 wt% cerium.

Claim 24 (Original): The apparatus of Claim 12 wherein the hydrogen-permeable selective membrane is selected from platinum and platinum alloys.

Claim 25 (Original): The apparatus of Claim 12 wherein said membrane has a thickness in the range of 10 Angstroms to 150mm.

Claim 26 (Original): The apparatus of Claim 25 wherein said membrane has a thickness in the range of 0.1 to 20mm.

Claim 27 (Original): The apparatus of Claim 26 wherein said membrane has a thickness in the range of 0.5 to 10mm.

Claim 28 (Currently Amended): The apparatus of Claim 27 wherein said membrane has a permeability in the range of 8 x 10-4 to 80 standard cubic meters/m^2-sec-$bar^{½}$ ~~standard cubic meters/m^2/sec/$bar^{½}$~~.

Claim 29 (Currently Amended): The apparatus of Claim 1 wherein ~~further comprising~~ said outlet for hydrogen is in communication with ~~steam reformer functions alone as a hydrogen generator to supply a source of hydrogen for~~ any apparatus ~~process~~ requiring a source of hydrogen.

Claim 30 (Currently Amended): The apparatus of Claim 29 wherein said outlet for hydrogen is in communication with one or more ~~steam reformer functions alone as a hydrogen generator to supply a source of hydrogen for any process~~ apparatuses selected from the group consisting of apparatuses used in the production of ammonia, production

of electricity, refining, semiconductor processing, hydrogen peroxide manufacture, hydrogenation of chemical intermediates and production of hydrogen for chemical analytical testing.

Claim 31 (Currently Amended): The apparatus of Claim 1 wherein ~~further comprising~~ the apparatus for steam reforming is in communication with a fuel cell.

Claim 32 (Currently Amended): The apparatus of Claim 31 wherein the fuel cell is a ~~high pressure~~ fuel cell adapted to operate at pressures of greater than atmospheric pressure.

Claim 33 (Currently Amended): The apparatus of Claim 32 wherein the fuel cell is a ~~high pressure~~ molten carbonate fuel cell adapted to operate at pressures of greater than atmospheric pressure.

Claim 34 (Original): The apparatus of Claim 31 wherein said steam reformer is scalable and easily adjustable to any size fuel cell.

Claim 35 (Currently Amended): The apparatus of Claim 34 wherein said steam reformer is mobile ~~and lightweight~~.

Claims 36-39 (Canceled)

Claim 40 (Currently Amended): The apparatus of Claim 1 ~~39~~ wherein said steam reformer is constructed of an alloy containing less than 25% Cr and less than 20% Ni, with most of the balance comprising iron.

Claim 41 (Original): The apparatus of Claim 40 wherein the alloy contains about 15 to 20% Cr and about 5 to 15% Ni.

Claim 42 (Original): The apparatus of Claim 41 wherein the alloy is AISI 304 stainless steel, comprising about 18% Cr, about 8% Ni, and the most of the balance Fe.

Claim 43 (Currently Amended): The apparatus of claim 2 wherein the apparatus is adapted to convey steam as a sweep gas ~~is steam~~.

Claim 44 (Original): The apparatus of claim 1 further comprising said inside section is packed with a methanation catalyst to react with any trace amounts of CO present in the hydrogen which permeates through said membrane.

Claim 45 (Currently Amended): The apparatus of claim 1 wherein the apparatus is adapted to transfer between 90 and 95% of the heat generated by the flameless distributed combustion in the outside section ~~combustors is transferred~~ to said annulus section containing said reforming catalyst.

Claim 46 (Canceled)